PRELIMINARY ANNOTATED LIST OF THE WASPS OF LOST RIVER STATE PARK, WEST VIRGINIA, WITH DESCRIPTIONS OF NEW SPECIES AND BIOLOGICAL NOTES

(Hymenoptera, Aculeata)

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The following preliminary list of the wasps of Lost River State Park, West Virginia enumerates the species captured during a week's stay in the park with my family (June 18-25, 1951), and an excursion of one day (July 18, 1951) with E. A. Chapin and O. L. Cartwright.

The park is located in the Shenandoah Mountains of eastern West Virginia, and comprises nearly 4000 acres at elevations ranging from 1750 to 3250 feet. Almost the entire area is covered with dense to open woods except for some open spots along steep hillsides.

The wasp fauna, like the flora, shows a mingling of northern and southern elements. While many of the wasps (42 species) are common to both the Transition and Upper Austral Zones, there are 15 which are chiefly Transition (or Transition and Canadian) in distribution and 12 which are predominantly Austral. The presence of a typically Canadian element, *Vespula norwegica norvegicoides* (Sladen), is noteworthy. The several remaining species are known from so few localities that it is not possible to deduce their faunal affinities. A total of 78 species is recorded herein.

I am indebted to the following specialists for identifications of prey of several wasps discussed herein: B. J. Kaston (Araneae), Miss Louise M. Russell (Homoptera) and C. W. Sabrosky (Diptera).

Family **TIPHIIDAE**

Tiphia egregia Viereck. 1 ♀; July 12.

Tiphia micropunctata Allen. 2 ♂♂; June 21.

Myrmosa (Myrmosa) unicolor Say. 3 ♂♂; June 23 and July 12.

Family **MUTILLIDAE**

Pseudomethoca frigida (Smith). 2 ♀♀; June 21 and 28.

Family **SAPYGIDAE**

Sapyga centrata Say. 1 ♀; June 19; taken resting on trunk of loblolly pine in open woods. The putative host in this area is the megachilid bee, *Hoplitis* (*Alcidamea*) *t. truncata* (Cresson), which was nesting in the trunk of this pine tree.

Family **VESPIDAE**

Vespula (Vespula) maculifrons (Buysson). 3 ♀♀, 2 ☿☿; June 21, 22, 24 and July 12.

Vespula[1] **(Vespula) rufa consobrina** (Saussure). 1 ♀, June 19; 13 ☿☿, July 12.

Vespula (Vespula) rufa vidua (Saussure). 2 ♀♀; June 18.

Vespula (Vespula) vulgaris (Linnaeus). 3 ♀♀; June 18 and 23.

Vespula (Dolichovespula) arenaria arenaria (Fabricius). 1 ♀, June 19; 1 ☿, June 21.

Vespula (Dolichovespula) maculata (Linnaeus). 1 ☿; June 23.

Vespula (Dolichovespula) norwegica norvegicoides (Sladen). 1 ♀; June 21.

Polistes fuscatus pallipes Lepeletier. 2 ♀♀; June 20 and 22.

Rygchium foraminatum foraminatum (Saussure). 3 ♀♀, 2 ♂♂, June 20 and 23.

Rygchium leucomelas (Saussure). 1 ♂; June 21.

Ancistrocerus antilope antilope (Panzer). 7 ♀♀; June 20-24.

Ancistrocerus campestris (Saussure). 19 ♀♀, 1 ♂; June 18-22; nesting in burrows in logs of cabin walls.

Ancistrocerus tigris tigris (Saussure). 2 ♀♀, 4 ♂♂; June 19-24.

Symmorphus canadensis (Saussure). 25 ♀♀, 12 ♂♂; June 19-24 and July 12; nesting in burrows in logs of cabin walls.

Stenodynerus (Parancistrocerus) fulvipes fulvipes (Saussure). 1 ♀, 2 ♂♂; June 21 and 24.

Stenodynerus (Parancistrocerus) pedestris pedestris (Saussure). 3 ♀♀; June 20, 21 and July 12.

Stenodynerus (Parancistrocerus) perennis perennis (Saussure). 1 ♀, June 20.

Family **POMPILIDAE**

Chirodamus albopilosus (Cresson). 1 ♀; June 23; in woods.

Dipogon (Deuteragenia) pulchripennis (Cresson) [det. H. K. Townes]. 1 ♂; June 22; on trunk of pine tree in woods.

Dipogon (Deuteragenia) sayi sayi Banks. 3 ♀♀; June 21-24 and July 12; several captured on trunks of pine trees in woods.

Priocnemis (Priocnemis) minorata Banks. 1 ♀; June 23; in woods.

Priocnemis (Myrmecosalius) germana (Cresson). 1 ♀, 11 ♂♂; June 19 and July 12; in woods.

Priocnemis (Myrmecosalius) scitula relicta Banks. 1 ♀, 5 ♂♂; July 12; in open woods.

Calicurgus hyalinatus alienatus (Smith). 5 ♀♀, 2 ♂♂; June 19-24 and July 12; in open woods.

Phanagenia bombycina (Cresson). 1 ♀; June 19; in woods.

Auplopus nigrellus (Banks) [det. H. K. Townes]. 2 ♀♀, 1 ♂; June 21 and 23; in open woods.

Auplopus mellipes (Say). 4 ♀♀, 1 ♂; June 19, 23, 24 and July 12. Some observations were made on the nesting activities of one female

[1] Social wasps of this genus were extremely common and no attempt was made to capture all specimens seen.

(62351 A) on June 23rd. This specimen was first noticed while she gathered a pellet of damp clay in a sunny, open area along the edge of a trail about mid-afternoon. She flew down the trail about 25 feet with the bit of clay, and disappeared beneath a slight overhang of the bank along the edge of the trail. In a few seconds she returned to gather another pellet of clay. It took her only a few seconds to obtain this, and again she flew at once to the site of her building activities. This time she was captured when she emerged from beneath the overhang. Two cylindrical, clay cells, side by side and about half an inch long and a quarter of an inch in diameter, were found on the under surface of an exposed, decaying tree root. One cell was complete and capped at each end; the other was almost complete and lacked only the final cap. The completed cell was still damp, and had been stocked very recently, for the wasp egg had not hatched. The spider prey, a female gnaphosid, *Herpyllus vasifer* (Walckenaer), bore the wasp egg firmly attached on the right side of the abdomen at the anterior third. The wasp had amputated all the spider's legs at the trochanters except the first two on the left side. The spider was thoroughly paralyzed and exhibited only weak, quivering movements of the mouthparts and remaining legs. The wasp egg did not hatch, having been injured during transportation back to the cabin.

Ceropales fraterna fraterna Smith. 1 ♂; June 24.

Allaporus rufiventris (Cresson). 1 ♀; June 20; on gravelly slope in sun along edge of trail.

Psorthaspis mariae (Cresson). 2 ♀♀; July 12; along edge of trail in open woods; a sight record.

Episyron biguttatus biguttatus (Fabricius). 2 ♀♀; June 21 and 22.

Anoplius (Arachnophroctonus) semirufus (Cresson). 1 ♀; June 20.

Anoplius (Pompilinus) insolens (Banks). 2 ♂♂; June 21.

Anoplius (Pompilinus) marginatus (Say). 4 ♀♀; June 20-23.

Anoplius (Pompilinus) rectangularis rectangularis (Dreisbach). 2 ♂♂; June 20; in woods.

Anoplius (Anoplius) virginiensis (Cresson). 9 ♀♀, 7 ♂♂; June 18-24 and July 12; in open woods.

Pompilus (Arachnospila) arctus Cresson. 1 ♀; June 19; in woods.

Pompilus (Anoplochares) apicatus Provancher. 4♀♀, 9♂♂; June 19-24 and July 12; in woods.

Aporinellus fasciatus (Smith). 1 ♀; June 24.

Family **SPHECIDAE**

Trypoxylon (Trypoxylon) frigidum Smith. 10♀♀, 6 ♂♂; June 19-24 and July 12; in woods and nesting in burrows in logs of cabin walls.

Trypoxylon (Trypoxylon) pennsylvanicum Saussure. 1 ♀; June 21.

Trypoxylon (Trypoxylon) richardsi Sandhouse. 1 ♀; June 23; in open woods.

Trypoxylon (Trypargilum) politum Say. No specimens seen, but typical, abandoned "pipe-organ" nests seen on cabin wall.

Trypoxylon (Trypargilum) striatum Provancher. 1 ♀; July 12; gathering damp clay along trail; a sight record.

Diodontus (Diodontus) trisulcus (Fox). 3 ♀♀; June 19 and 22 and July 12; the June females taken hovering before burrow openings in logs of cabin walls.

Psen (Psen) monticola (Packard). 1 ♀; July 12.

Mimesa (Mimumesa) nigra (Packard). 3 ♀♀, 4 ♂♂; June 19-21 and July 12; several females taken hovering before burrow entrances in logs of cabin walls.

Pemphredon (Pemphredon) virginiana Rohwer. 2 ♀♀; June 20; both taken hovering before burrow entrances in bark of loblolly pine; one of them (62051 A) was carrying a paralyzed adult aphid, *Cinara* species, at 6 p.m.

Stigmus (Stigmus) americanus Packard. 27 ♀♀, 22 ♂♂; June 18-24 and July 12; nesting in the logs of the cabin walls; one female (62151 A) was captured carrying a nymphal aphid, probably *Myzocallis* species.

Stigmus (Stigmus) fraternus Say. 2 ♀♀, 2 ♂♂; June 20 and 24 and July 12.

Passaloecus annulatus (Say). 2 ♀♀; June 19; nesting in logs in cabin walls.

Passaloecus mandibularis (Cresson). 8 ♀♀, 1 ♂; June 19-24; taken in woods and nesting in logs in cabin walls.

Passaloecus relativus Fox. 6 ♀♀, 7 ♂♂; June 18-24; nesting in logs in cabin walls.

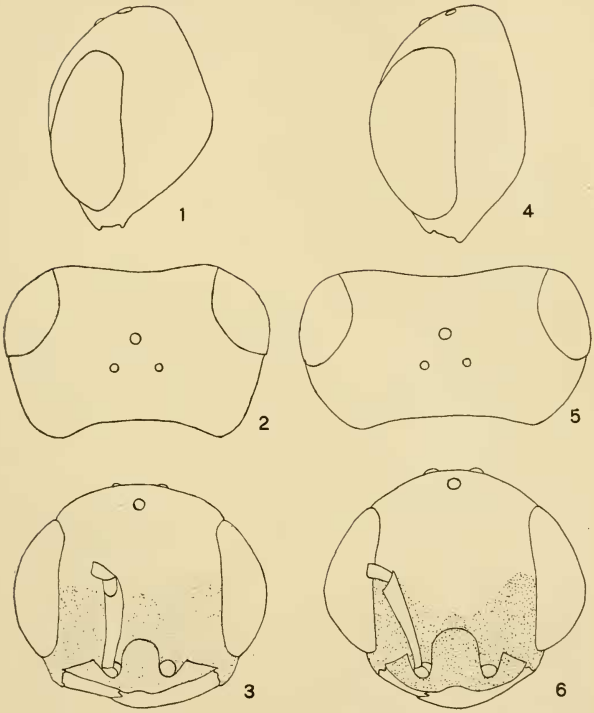
Spilomena ampliceps, new species

Figs. 1-3

The present species is separated from the previously described Nearctic species by the well-developed temples and vertex. In the female of *ampliceps* the greatest width of the temple is 1.3 the greatest eye width viewed from laterally, and the greatest length of the vertex is subequal to the greatest eye length viewed from above. In the male of *ampliceps* the greatest width of temple is subequal to the greatest eye width, and the greatest vertexal length is 0.9 the greatest eye length. In *Spilomena pusilla* (Say) (figs. 4-6) the proportions of the head and extent of the yellow maculations on front of male are different from those of *ampliceps*. The affinities of *ampliceps* with other species will be discussed in a forthcoming revision of the genus.

Type.—Male, Lost River State Park, Hardy County, West Virginia, June 19, 1951: hovering before burrow entrance in log of cabin wall (K. V. Krombein). Placed on loan deposit in U. S. National Museum.

Male.—Length 2.3 mm., forewing 1.6 mm. Black, without metallic re-



Figs. 1-3, *Spilomena ampliceps,* new species (paratypes from Lost River State Park, W. Va.); figs. 4-6, *Spilomena pusilla* (Say) (pair from Lost River State Park, W. Va.). Figs. 1 and 4, lateral view of head of female; figs. 2 and 5, dorsal view of head of female; figs. 3 and 6, frontal view of head of male (extent of yellow facial markings indicated by shaded areas). X71.

flections, the following lemon yellow—mandible except apex, clypeus, malar space, postmandibular triangle, lower half of front more or less (this spot narrowed in middle) and antennal scape; the following testaceous—apex of mandible, antennal pedicel and flagellum except last segment, tegula, fore and mid legs entirely, and hind trochanter, tibia and tarsus. Pubescence very sparse in general, appressed and pale, the head with a few scattered setulae on upper front and vertex, thorax bare except mesonotum and mesosternum somewhat more densely setose than head, abdominal tergites almost bare except for a few, very scattered setulae at apices of posterior segments, second to sixth sternites with well-defined hair bands, those of second to fourth covering approximately the apical third of exposed areas of segments, and those of last two covering all the exposed areas. Wings clear hyaline with some iridescent reflections, the stigma black and veins brown.

Head shining, delicately and minutely lineolate; in frontal view (fig. 3) subcircular, the height slightly less than the greatest width (7:8); viewed from above the head behind the eyes is almost (0.9) as long as the greatest eye length above; viewed from the side, the temple is angulate behind with the angle opposite the middle of eye, and the greatest width of temple subequal to greatest eye width; length of antennal scape 0.6 the clypeal width at anterior mandibular condyles; postocellar distance subequal to ocellococipital distance and 0.6 the ocellocular distance; front with a central carina, strong below and gradually becoming weaker until it disappears halfway to anterior ocellus.

Thorax shining; pronotum dorsally with a complete transverse carina, viewed from laterally not produced upward into a conspicuous tooth; mesonotum and scutellum more strongly lineolate than front, no punctures discernible at 85 diameters, the notauli evanescent; mesopleuron not lineolate or punctate, the episternal suture minutely foveolate; metapleuron smooth; sides of propodeum with a few oblique rugulae posteriorly and a carina separating lateral from posterior surface; posterior surface in addition with a median carina and a transverse carina above separating it from the dorsal surface, the posterior surface otherwise with a few oblique rugulae on each side of median line.

Second submarginal cell rectangular, 0.6 as high as wide; first transverse cubital and recurrent veins interstitial. Legs normal for genus.

Abdomen without noteworthy modifications except as detailed under the description of the vestiture.

Allotype.—Female, same data as type in every particular. Also placed on loan deposit in U. S. National Museum.

Female.—Length 2.7 mm., forewing 1.9 mm. Black, without metallic reflections, the mandibles ferruginous, the following testaceous—scape, pedicel, flagellum beneath, tegula, all trochanters, fore femur narrowly at base and apex, fore and mid tibiae, and all tarsi. Pubescence similar to that of male though correspondingly slightly denser, the sternites without dense hair bands, only scattered setulae on apical margins. Wings as in male.

Head shining, correspondingly more strongly lineolate than in male; in frontal view subcircular, the height subequal to greatest width; viewed from above (fig. 2) the head behind eyes is about as long as the greatest eye length above; viewed from the side (fig. 1) the temple is well-developed, angulate behind opposite the middle of eye, and with its greatest width 1.3 the greatest eye width; length of antennal scape 0.6 the clypeal width at anterior mandibular condyles; postocellar distance subequal to ocelloccipital distance and 0.6 the ocellocular distance; clypeus with a narrow, flat, trigonal platform in middle, the apical margin of which is shallowly emarginate; lower fourth of front with a sharp median carina which extends slightly onto base of clypeus and which becomes gradually evanescent above.

Thorax as in male, but scattered mesonotal punctures discernible at 60 diameters. Venation as in male. Legs and abdomen without modifications.

Paratypes.—One ♀, 1 ♂, same data as type in all particulars, but June 20 (♀) and June 22 (♂) [K. V. Krombein collection]. The paratypes do not vary significantly from the above descriptions of type and allotype. The male is 2.5 mm. long and the female is 2.4 mm.

Spilomena pusilla (Say) (Figs. 4-6.) 10 ♀♀, 5 ♂♂; June 18-23; hovering before burrow entrances in logs in cabin walls; none taken with prey.

Sphex arvensis (Dahlbom). 2 ♂♂; June 20; along trail in open areas.

Chalybion californicum (Saussure). 1 ♀; June 18-24; a sight record at swimming pool.

Nysson (Nysson) subtilis Fox. 9 ♀♀, 2 ♂♂; June 20-24 and July 12; along trail in open areas.

Gorytes (Gorytes) simillimus Smith. 2 ♂♂; July 12.

Cerceris clypeata Dahlbom. 1 ♂; July 12.

Crabro (Crabro) juniatae Krombein. 5 ♀♀; June 20-24; along trail at edges of wooded areas; one female (62051 B) captured carrying a paralyzed female anthomyid, *Hylemya ciliorura* (Rondani), the seed corn maggot.

The present series demonstrates a certain amount of variation in the yellow markings: the clypeus may have a pair of yellow spots; the pronotal dorsum usually has a yellow band broadly interrupted in middle, and the pronotal tubercles are usually yellow; scutellum may have a narrow, anterior band; in one specimen the small spots on first tergite are almost entirely absent.

Crossocerus (Crossocerus) lentus (Fox). 1 ♂; June 22.

Crossocerus (Crossocerus) minimus (Packard). 1 ♀; June 21.

Crossocerus (Crossocerus) planifemur, new species

This is distinguished from the other known Nearctic species of the typical subgenus by the following combination of char-

acters: in both sexes by the absence of a tubercle on mesopleuron before mid coxa and of a supra-orbital fovea, and presence of a weak, oblique tooth laterally on pronotum; in the female by the lack of a pecten on fore tarsus and predominantly pale trochanters, tibiae and tarsi; and in the male by the yellow beneath on head and thorax, the fore femur flattened beneath but not hirsute, and the mesosternum with appressed silvery pubescence only.

C. planifemur, like the Palaearctic *C. elongatulus* (van der Linden)[2], appears to be one of the few species, in an otherwise soil-dwelling subgenus, which nests in tunnels in wood.

Type.—Female, Lost River State Park, Hardy County, West Virginia, June 23, 1951; hovering before burrow entrance in log in cabin wall 10 feet above ground surface (K. V. Krombein). Placed on loan deposit in U. S. National Museum.

Female.—Length 5.3 mm., forewing 4.0 mm. Black, the apex of mandible, apex of clypeus, tegula, apices of second to fifth sternites and sixth sternite entirely, pale reddish; the following eburneous—mandible except tip, antennal scape and pedicel beneath, pronotal tubercle, trochanters beneath, fore femur beneath except at base, fore tibia except a narrow line beneath, mid and hind tibiae externally, and all tarsi, the terminal segments somewhat reddened. Wings hyaline with very weak iridescent reflections; stigma black, veins brown.

Head shining, the clypeus and temples with moderately dense, appressed, short silvery pubescence, the front and vertex with shorter, erect hair; clypeal lobe with apical margin broadly rounded, the surface of clypeus gently convex from side to side, the median length about 0.26 the distance between anterior mandibular condyles; upper part of front with close fine punctures and a strong furrow running forward from fore ocellus; supra-orbital foveae evanescent; vertex with scattered fine punctures; postocellar distance 0.62 the ocellocular distance; antennal scape slender, ecarinate, twice as long as median length of clypeus, flagellum reaching about to occiput, the ratio of scape, pedicel, first two and last two flagellar segments about 3.6:1.0:1.0:0.9:0.7:1.3.

Thorax with dorsum subopaque, the sides, venter and propodeum shining, the dorsum with fine, short, suberect pale hair, the mesopleuron and mesosternum with longer, appressed silvery hair, the rest of thorax and propodeum lacking pubescence; pronotum not crested, laterally with a weak oblique tooth; mesonotum with very fine, close lineolation and moderately dense, fine punctures; sutures between mesonotum, scutellum and postscutellum deeply impressed but not foveolate; scutellum and postscutellum gently convex, punctate as on mesonotum; mesopleuron more closely punctate anteriorly than posteriorly, not tuberculate before

[2] Hamm, A. H. and O. W. Richards, 1926, The Biology of the British Crabronidae. Trans. Ent. Soc. London, p. 315.

mid coxa, the episternal suture weakly foveolate, the posterior margin very delicately and minutely foveolate; metapleuron glabrous, the posterior margin about as strongly foveolate as episternal suture; propodeum shining, the lateral surface separated by a well-developed carina from dorsal and posterior surfaces, the dorsal surface with a well-defined, more or less trapezoidal smooth enclosure margined anteriorly and on sides by foveolate furrows, and bisected by a narrow foveate channel which terminates in the narrow discal impression of posterior surface.

Fore tarsus not flattened or pectinate; longer spur of hind tibia straight, about two-thirds as long as hind basitarsus.

Abdomen dorsally subopaque from very delicate lineolation, the venter shining, the tergites with fine scattered punctures bearing sparse, appressed silvery setae; pygidium flat, almost an equilateral triangle in outline, and with a few, scattered coarse punctures bearing short, fine, suberect bristles; second to fifth sternites with one to several rows of preapical punctures.

Allotype.—Male, same data as type in every particular, but June 24, 1951. Also placed on loan deposit in U. S. National Museum.

Male.—Length 5.3 mm., forewing 3.8 mm. Black, tip of mandible, antennal scape and flagellum beneath and tegula reddish; the following lemon yellow: mandible except tip, clypeus, head beneath entirely, lower fourth of temple, transverse band on dorsum of pronotum except laterally, pronotal lobe, lower half of side of pronotum, lower two-thirds of mesopleuron before episternal suture and lower third behind it except a small dark spot before mid coxa, anterior half of scutellum, entire thoracic sternum, fore and mid legs entirely except short narrow lines below on mid femur and fore and mid tibiae, hind coxa and trochanter entirely, hind femur beneath except at apex, hind tibia except for short narrow lines on outer surface and beneath, and hind tarsi.

Sculpture similar to that of female, but the punctures slightly sparser, and integument, particularly the mesonotum, shinier; the following differences may be noted: propodeal area at base with a longer area foveolate, pronotal tooth weaker, median length of clypeus 0.29 the distance between anterior mandibular condyles, and ratio of scape, pedicel, and first two and last two flagellar segments as 4.7:1.0:1.0:1.0:0.9:1.6.

The following secondary sexual characters are of importance: flagellum beneath with a fringe of hair, mesosternum flat and with dense, very short, fine, appressed silvery pubescence; fore femur broad, flat beneath but without hair, the length about 2.5 the greatest width, the legs otherwise not modified; sternites unmodified except the fourth to seventh with apical margins shallowly and rather narrowly emarginate in middle; last tergite without delimited pygidial area, and with a few scattered punctures which are coarser than on preceding tergite.

Paratypes.—One ♀, Ithaca, Tompkins County, New York, July 21, 1938 (J. G. Franclemont) [K. V. Krombein collec-

tion]. 1 ♀, Washington, District of Columbia; July 23, 1947 (D. G. Shappirio) [D. G. Shappirio collection]. The paratypes agree with the above description of the type in all essential details; they are respectively 6.0 and 5.7 mm. long.

Crossocerus (Crossocerus) similis (Fox). 1 ♀, 2 ♂♂; June 18 and 22 and July 12.

Crossocerus (Blepharipus) ambiguus (Dahlbom). 1 ♀; June 21; in open woods hovering before pile of fireplace wood.

Crossocerus (Blepharipus) harringtonii (Fox). 9 ♀♀, 1 ♂; June 21-23; in open woods. The male of this species has not been recognized previously. In Pate's key[3] to the species of this subgenus the male of *C. harringtonii* runs to couplet 9 and differs from the species keying out there and in the succeeding couplet in the following combination of characters: fore trochanter flattened beneath but without long, dense erect hair; fore femur flattened beneath and without long dense hair, the hind margin extended downward as a flange on apical half so that apical part of femur appears concave beneath; fore tibia flattened, but not explanate nor with long hair beneath; antennal flagellum not fringed nor tuberculate beneath; propodeal enclosure not defined; supra-orbital fovea minute, shallow and punctiform. In other respects it is quite similar to female *C. harringtonii*, differing only in having outer surface of fore tibia and a narrow line on hind basitarsus creamy, and in the comparatively sparser and weaker punctation. The single male taken at Lost River is 5.6 mm. long, forewing 4.1 mm.

Crossocerus (Blepharipus) impressifrons (Smith). 1 ♀; June 21; in open woods.

Crossocerus (Blepharipus) tarsalis (Fox). 4 ♀♀, 1 ♂; June 20-23; in open woods.

Crossocerus (Blepharipus) wickhamii (Ashmead). 1 ♂; June 22; in open woods.

Ectemnius (Clytochrysus) nigrifrons (Cresson). 1 ♀; June 21.

Ectemnius (Hypocrabro) continuus (Fabricius). 2 ♂♂; June 18 and 21.

Lestica (Solenius) producticollis (Packard). 2 ♀♀, 3 ♂♂; June 19-24.

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[3] Pate, V. S. L., 1944 (1943), The Subgenera of *Crossocerus*, with a Review of the Nearctic Species of the Subgenus *Blepharipus*. Lloydia 6: 295-297.